

Ideal Water for Beer Brewing p.4



Training Calendar p.6-7

The Vermont Rural Water Association provides training and support to drinking water and wastewater systems to promote healthy communities, rivers, and lakes across Vermont.

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On the cover: Vermont craft beer, photo by Tim Russo.



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What can we do better now? We can educate the

public, our local officials,

and our boards, managers, and administrators about our important work.

Every day, we are protect-

environment. We don't say

ing public health and the

this enough. We need to

emphasize that our work

is keeping everyone safe

It's not getting easier, so let's do hard better



by Liz Royer Executive Director

ermont Rural Water was very excited to host the first Water Professionals Appreciation Day on July 8, with a disc golf tournament and luncheon. Nearly 100 attendees came together at Smuggler's Notch Resort to celebrate their hard work and dedication to the water and wastewater industry. In addition to system employees, we were joined by board members, regulators, engineers, hydrogeologists, contract operators, equipment dealers, and others. We are lucky in Vermont to consider all of these folks our partners, and we work together to make our industry stronger.

Three people deserve special recognition for making the day a success: Trevor Welch, water and wastewater operator in Jeffersonville (VRWA Member): and Vermont Rural Water staff members Diana Butler and Paul Sestito. We were also joined by Lieutenant Governor Molly Gray, who gave remarks on improving the water workforce in Vermont and also listened to conversations about the challenges facing water and wastewater systems. I know many others wanted to join us, and we are hoping to make this an annual event.

For those who could not attend, I wanted to share a portion of the remarks that I gave, as I think these words are important to keep in mind given the current state of the world:



Liz Royer (right) and Lieutenant Governor Molly Gray at Water Professionals Appreciation Day.

A friend recently sent me a quote from Kara Lawson, the women's basketball coach at Duke:

"Don't wait for things to get easier. You just have to do hard better."

This is true for so many aspects of our post-pandemic lives, but I think it is especially true in the water and wastewater industry. There are going to continue to be stricter regulations. Our infrastructure is going to continue to crumble. There isn't going to be enough funding to

fix and replace everything. PFAS aren't going to go away (literally).

Things are not going to get easier for us. We are going to have to figure out how to face these challenges and do hard better.

and healthy as well as keeping Lake Champlain, the Connecticut River, all of our waterbodies, and our groundwater aquifers clean. What can we do better now? We can face our workforce challenges and work together to find solutions. In recent months, several job openings in our industry have had no applicants. Many systems are

no applicants. Many systems are struggling with retention. We need to attract younger people to our industry. We need to pay better. In 2022, hiring has become about what the employer can offer the candidate, not the other way around. Can we offer flexible schedules? What other benefits would attract more diversity to our industry?

» CONTINUED ON PAGE 10

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How Water Chemistry Influences Beer Brewing



by Tim Russo Deputy Executive Director

't should surprise no one that Vermont leads the nation in L breweries per capita (we have 74 craft breweries, which is nearly 15 for every 100,000 Vermonters).

Our industry often talks about how wastewater systems must deal with high-strength discharges from the proliferation of local breweries. But this time, I thought it might be interesting to take a look at how water affects the beer brewing process itself.

My curiosity about this topic began at small brewery near Vermont Rural Water's office. The brewers there were having an issue controlling their pH. The water came in at a neutral 7. but when heated, the pH increased in a way that was a bit of a mystery. Looking at some lab results, it became clear that the levels of CO_a could be the cause. When carbon dioxide is dissolved in water, the release of hydrogen ions in carbonic acid is what lowers the pH.

This conversation sparked a year-long fascination on the topic of water chemistry in the brewing process for me. I've spent time reading, researching, and, of course, visiting breweries and talking to brewers.

I quickly discovered that brewers are as obsessed with water chemistry as are we in the water industry. They talk about things like hardness, pH, and chlorine just like we do. And like a water



Dirt Church Brewing Company's beer (left) and brewing vessels at Queen City Brewery. Opposite: Tim enjoys a pint at Switchback Brewing Co.

operator, a brewer needs to be skilled in many areas: chemistry, mechanics, plumbing, and artistry.

I first talked with Jen Fleckenstein and Steve Parker at Clear Water Filtration (VRWA Member). Their company works with many breweries-as well as cideries and coffee shops-to optimize the water for these businesses.

Jen told me breweries that get their water from a community water system will start by dechlorinating. They don't want

skilled in many areas: chemistry, mechanics, plumbing, and artistry. ular style originated. the beer to taste of chlorine and

Like a water operator,

a brewer needs to be

they don't want the chlorine interfering with the brewing process. Sometimes they will also adjust hardness to match their beer style.

In traditional brewing—prior to modern-day treatment techniques-the beer style was dictated largely by the chemistry of the water that was available in a particular region. Generally speaking, hard water containing lots of calcium and magnesium is best

suited to beers with darker profiles and hop-forward flavors. A richer mouthfeel is another characteristic of beer brewed with hard water.

Softer water is perfect for brewing light beers such as lagers and Pilsners. Low alkalinity and a favorable sulfate-to-chloride ratio describes the water best suited for beers of these styles.

> Nowadays, brewers have the option to adjust the water chemistry to mimic that of water in regions of the world where a partic-This is done using

reverse osmosis to filter out particles and minerals, then adjusting the water chemistry as needed. RO also allows for consistency of flavor, as it won't be affected by seasonal changes to water chemistry.

But most of Vermont's breweries don't use RO, according to Jen. In fact, many take pride in using their community's water as it naturally is. After all, water is a locally sourced ingredient.



Dirt Church Brewing Company in East Haven is one such brewery. Co-owner Anna Cronin told me that they use groundwater that is very hard, and she thinks it is great for beer. Anna is the type of brewer that lets the water chemistry dictate the style that she brews.

She also explained the importance of chloride in beer making. Sodium chloride (commonly known as table salt) in water is dissociated into the sodium and chloride ions, both of which contribute to the flavor and taste perception in the final beer. The sodium ions give "salty" notes and a harshness that most brewers try to avoid.

Enter calcium chloride, typically used to lower pH and add hardness. The chloride ion is thought to promote palate fullness, sweetness, or mellowness within the flavor profile.

Sulfates increase the perceived hop character of the beer, and the desired sulfate-to-chloride ratio depends on the type of beer a brewer is making: a 2:1 ratio can be used for hop-forward beers like IPAs, while a 1:2 ratio can be used for mild ales or stouts.

As I learned in my first conversation at the brewery near our office, pH is hugely important. According to the website for Australian brewer Black Hops:

[pH] affects every stage of the brewing process. In simple terms, the pH level of your brewing water needs to fall within specifically defined ranges to enable optimal enzymatic reaction and protein coagulation. During fermentation, getting your pH balance right will promote a good environment for yeast and conversely an undesirable environment for bacteria.

Water with a pH of lower than the normal 6.5 to 8.5 range is more prone to dissolving metals such as iron and manganese. This is typically undesirable, even in low concentrations.

To say I've just covered the basics is an understatement. Many entire books have been written on the subject of water chemistry in the beer brewing process. I would really love to hear from any water system operators who have had discussions with brewers in their communities regarding water chemistry. Drop me an email: trusso@vtruralwater.org

I conclude with several thank-yous: Jack and Emily at Weird Window Brewing, Anna at Dirt Church Brewing Co., Aaron at Goodwater Brewery, and our friends at Clear Water Filtration, Jen and Steve. Cheers!



Training Calendar

Fall 2022

Date	Course	TCHs	Location	Cost (Member/Non)	
Oct 4 – 25 8 am – 12:30 pm	Small Systems Class 2 Water Operator Certification Course	16 W	Essex*	No cost	
Tue, Oct 11 9 am – 11:30 am	Service Line Inventory Overview	2 W	Zoom	\$14 / \$28	
Tue, Oct 11 8:30 am – 1 pm	Proper Laboratory Sampling Procedures for Water and Wastewater	4 W WW	Montpelier**	\$28 / \$56	
Wed, Oct 12 9 am – 3 pm	Dairy Wastewater Exam Review	5 WW	Montpelier**	\$35 / \$70	
Thur, Oct 13 9 am – 12:30 pm	Pathogens in Wastewater	3 WW	Zoom	\$21 / \$42	
Thur, Oct 20 8 am – 3 pm	Comprehensive Water & Wastewater Chemistry with Jar Testing Basics	6 W WW	Montpelier**	\$42 / \$84	
Thur, Oct 27 9 am – 1:30 pm	Activated Sludge: Non-filamentous Settleability Problems and Loss of Solids	4 WW	Zoom	\$28 / \$56	
Fri, Oct 28 8 am – 2 pm	Basic Math for Water and Wastewater Operators	5 W WW	Essex*	No cost	
Tue, Nov 1 9 am – 12:30 pm	Small Systems Class 2 Exam Preparation Course	3 W	Zoom	No cost	
Tue, Nov 1 9 am – 1:30 pm	Class 3 & 4 Exam Preparation Course	4 W	Zoom	\$28 / \$56	
Wed, Nov 2 9 am – 1:30 pm	Distribution Exam Preparation Course	4 W	Zoom	\$28 / \$56	
Thur, Nov 3 8 am – 12:30 pm	Breweries and Your WWTF	4 WW	Montpelier**	\$28 / \$56	
Wed, Nov 9 9 am – 12:30 pm	Water Treatment: Chemical Addition	3 W	Essex*	No cost	
Tue, Nov 15 9 am – 12:30 pm	Water Treatment: Filtration Processes	3 W	Essex*	No cost	
Tue, Nov 16 9 am – 12:30 pm	Optimize Your Water and Wastewater Pump Stations	3 W WW	Montpelier**	\$21 / \$42	
Thur, Nov 17 9 am – 12:30 pm	Water Treatment: Filtration Processes	3 W	Zoom	No cost	
Fri, Nov 18 9 am – 11:30 am	Service Line Inventory Overview	2 W	Zoom	\$14 / \$28	
TCH = Training Contact Hours W = Approved for Water Credit WW = Approved for Wastewater Credit					

Register Online: <u>VTruralwater.org/training</u>

Date	Course	TCHs	Location	Cost (Member/Non)
Thur, Dec 1 9 am – 12:30 pm	Water Distribution: Operation and Maintenance	3 W	Zoom	No cost
Tue, Dec 6 9 am – 12:30 pm	History of Water Treatment	3 W	Zoom	No cost
Wed, Dec 7 9 am – 12:30 pm	Vermont Wastewater Treatment Facilities and PFAS	3 WW	Montpelier**	\$21 / \$42
Thur, Dec 8 9 am – 12:30 pm	OSHA: Environmental Awareness and Workplace Violence	3 ₩ (WW pending approval)	Zoom	No cost
Fri, Dec 9 9 am – 11:30 am	Service Line Inventory Overview	2 W	Zoom	\$14 / \$28
Tue, Dec 13 9 am – 12:30 pm	Chemical Feed Pumps	3 W	Hybrid Zoom/Essex*	\$21 / \$42
Fri, Dec 16 9 am – 11:30 am	Service Line Inventory Overview	2 W	Zoom	\$14 / \$28
TCH = Training Contact Hours W = Approved for Water Credit WW = Approved for Wastewater Credit				

Locations

*Essex: Vermont Rural Water's office – 20 Susie Wilson Rd, Suite B, Essex Junction, VT 05452

**Montpelier: Public Works Garage – 783 Dog River Road, Montpelier, VT 05602

Registration and Payments

Register online at <u>VTruralwater.org/training</u> to pay by credit card or check, or mail in the form below. Registrations received less than 24 hours prior to class are subject to a late fee.

Members of the Vermont Rural Water Association receive a 50% discount on registration costs.

Cancellations/Refunds

Cancellations received at least 24 hours in advance can receive a refund or transfer to another class. No-shows will be charged the full course fee.

Accommodations

Call 802-660-4988 or email info@vtruralwater.org prior to the day of class to request accommodations.

Registration Form

Essex Junction, VT 05452

Duplicate this form to register for multiple classes.

Course and Date:		
Attendee Name(s):		
System/Organization:		
Address:		
Email:		_ Phone:
		(number where you can be reached before class)
Mail this form and payment to: VRWA 20 Susie Wilson Rd. Suite B	Questions? info@vtruralwater.org 802-660-4988	

FALL 2022 7

- YANKEE INGENUITY



by Wayne Graham Wastewater System Specialist

This column details clever solutions that operation specialists come up with every day. Below are several cases of them solving problems, saving money, and making life at their second home—the treatment plant—a little easier.

Move It or Lose It

Are you sick of plug valves that become difficult or impossible to move? Over time, the bottom of the valve body that holds the internal rubber-coated plug will corrode, making the plug very hard to operate. Operators at St. Johnsbury and Richford (VRWA Members) have found a solution. After disassembling the valve, then cleaning and lubricating the bottom of the plug, they installed a grease fitting at this critical location between the bottom of the plug and valve body. It's certainly a better alternative then replacing these costly valves.



A plug valve—a grease fitting would be added to very bottom of valve body.



Fans (top) and filters (bottom) should always be on and kept clean.

Cool and Breezy

During the Basic Wastewater Course, Paige Blaker from the Ed Weed Fish Culture Station wastewater facility in Grand Isle, brought up a great point while we were discussing UV disinfection systems: UV electrical panels can generate heat, so it is critical to keep the fans and filters clean and unobstructed to prevent the panels from overheating. The same goes

for any electrical panel that needs air flow.

It is important to have tasks like cleaning fans and air filters scheduled in your maintenance program so you remember to do them periodically.





Seen with Shaving Cream

Most of us have experience with finding leaks in pressurized air or gas lines by using soapy water, which creates obvious bubbles at the leak. But what about vacuum leaks. like the suction side of digester gas compressors, blower systems, or even the suction side of pumps? I learned a trick from Dave Crawford of Champlin Associates (VRWA Member): shaving cream will slowly dissipate when applied to leaky joints or fittings. Anyone who has been frustrated with finding vacuum leaks now has another method to add to the toolbox. Thanks. Dave!

YANKEE INGENUITY





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Cable Saver

A sewer camera's cable can be damaged by the outside edge of a pipe. A cast iron or cut PVC pipe can be very abrasive, causing deep cuts or scrapes on the cable while the camera moves. I carry a few Fernco fittings to stick over or into the pipe to save my cable from wear when I'm using a sewer camera.

Top to bottom: Wayne with a sewer camera, a PVC pipe with a ragged egde, the pipe with a fitting to protect the sewer camera's cable.

Send your interesting ideas to me for future columns. I also encourage you to tour other facilities; you will find that networking with fellow operators can be very beneficial. Several organizations can also provide help: VT WARN, GMWEA, VT DEC, and of course, Vermont Rural Water.

Stay safe out there, we need you!

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APPRECIATION DAY

» CONTINUED FROM PAGE 3

What can we do better now? We need to continue to be proactive about promoting ourselves and the great work we do. Contact the press.* Invite your legislators for a tour of your facility. Have your manager shadow you for a day. Insist that your town officials come to a water board meeting and listen to debates about budgets and having to do more with less. Our efforts are starting to work, but we need to keep pushing-especially as everyone hears about this windfall of federal funding coming to water and wastewater infrastructure

projects. State legislators and local officials need to understand what that means for their towns, their infrastructure, and their facilities.

We are here today to celebrate our hard work and dedication to this industry. But we need to get others to do the appreciating too. Enjoy yourselves but let's continue this conversation about how to do hard better.

*Check out VT Digger's day-in-the-life article about Trevor Welch at Jeffersonville's water system at <u>bit.ly/3oZq14B</u>



About 30 people played in the disc golf tournament during Water Professionals Appreciation Day.



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Finding Forgotten Infrastructure



by Aaron Perez *Water System Specialist*

few months ago I got a call from Richard Manning, the water superintendent for Bethel (**VRWA Member**). Water was accumulating in the basement of a downtown residence, and Richard was looking for assistance identifying the cause.

We traced the line back to a remote site in the woods which ended up being the original springs that the town used at the turn of the century. It was also the water supply for the old railroad water refilling station. No one had been to the site in many years, and it had largely been forgotten. The springs needed their covers replaced and the storage tank needed to be fenced in. Richard did a great job of addressing these safety issues quickly.

This got me thinking about all the forgotten infrastructure that I have come across in my many years at Vermont Rural Water. Often, as municipal workers change, what they know goes with them.



The storage tank found in Bethel, after a fence was installed.



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It is important to develop a plan for transferring and retaining this institutional memory. A good first step is to audit your existing resources. For example, talk to the town office employees, look back through historical records, review town easements, and explore properties that may contain unknown municipal infrastructure.

Create an easy method to record the information you find. For example, there are readily available GIS mapping tools to help track and document information. You should also include this information in your Operation and Maintenance Manual.

Work with your team to create a plan to and continually record information about your infrastructure. Your record should be a living and evolving document that is accessible to current and future employees.

Under the new Lead and Copper Rule Revisions, all community and NTNC water systems are required to create service line inventories by October 2024. This will be a good opportunity for you to take stock of your infrastructure and create a record with information like the installation date and the material it's made of.

(Vermont Rural Water is working with DWGPD to offer trainings in the coming months about how to create a service line inventory. See our training calendar on page 6.)





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